Identification of Factors Associated with Early Readmission of Cardiothoracic Surgical Patients in a Community Hospital

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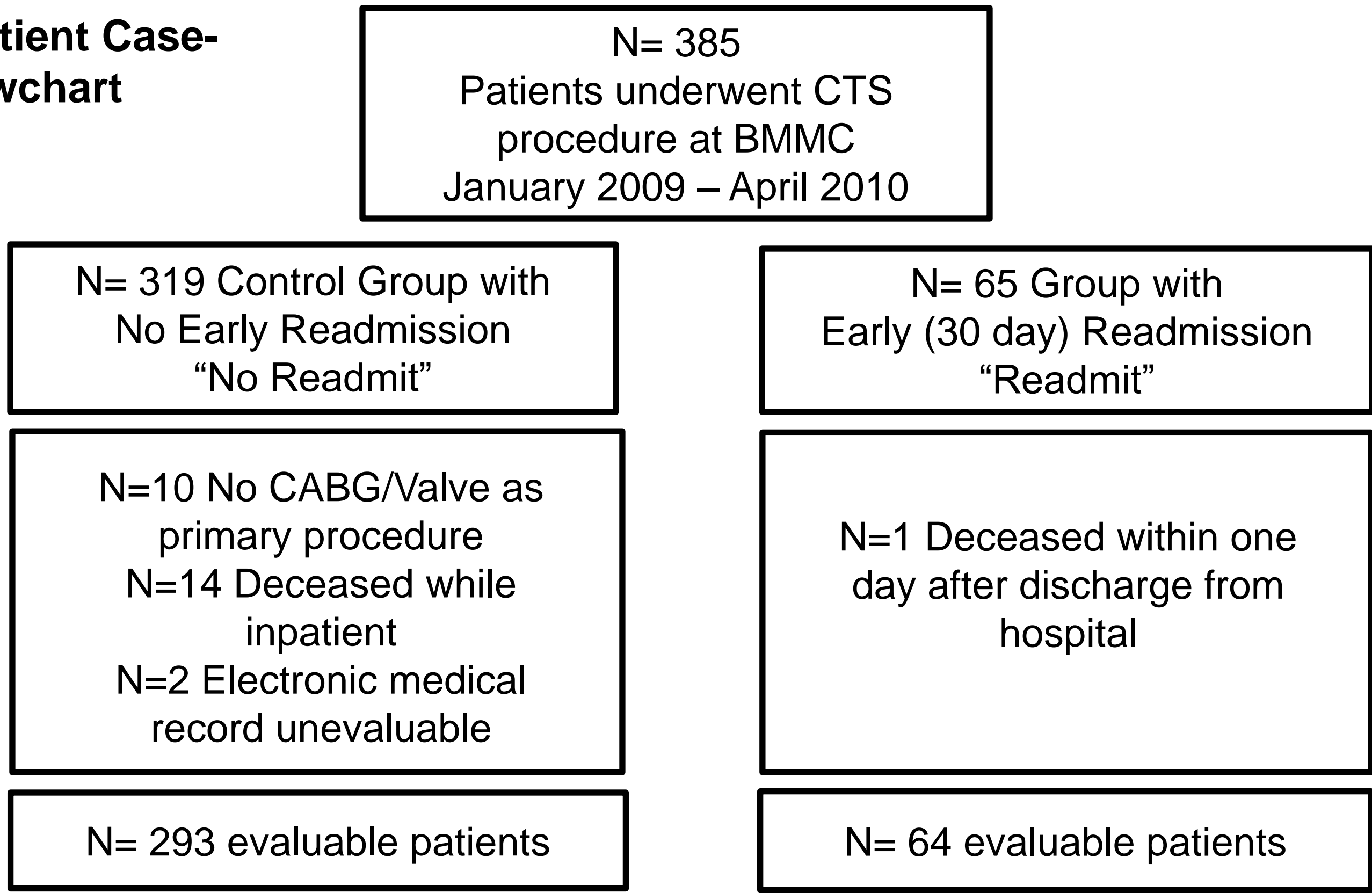
PURPOSE

- Patients undergoing cardiothoracic surgical procedures are at high risk for early, unplanned readmission to the hospital.
- Early hospital readmission rates following cardiac operations ranges from 8 to 21%.[1]
- Early readmission (30 day) following cardiothoracic surgery is costly and a burden to he health care system, however few published studies exist evaluating this problem.
- The purpose of this study was to identify risk factors associated with early readmission following cardiothoracic surgery in a community hospital.

METHODS

- The study was approved by the institutional review board.
- A retrospective, case-control study was conducted involving patients undergoing cadiothoracic surgical (CTS) procedures from January 2009 to April 2010.
- Patients readmitted within 30 days (Readmit) after discharge following a cardiothoracic procedure were analyzed and compared to patients who did not require readmission (No Readmit).
- Demographic, surgical and readmission data was obtained from the Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database.
- Patient home medications prior to surgery, discharge medications, and the date of their first cardiac rehabilitation visit was obtained from the electronic medical record.
- Categorical or continuous variables were reported as percentage or mean $\pm$ standard deviation (SD), respectively, and compared using appropriate statistical analysis.

RESULTS

Figure 1. Patient Case-Control Flowchart

N= 385 Patients underwent CTS procedure at BMMC January 2009 – April 2010

N= 319 Control Group with No Early Readmission "No Readmit"

N= 65 Group with Early (30 day) Readmission "Readmit"

N=10 No CABG/Valve as primary procedure
N=14 Deceased while inpatient
N=2 Electronic medical record unevaluable

N=1 Deceased within one day after discharge from hospital

N= 293 evaluable patients

N= 64 evaluable patients

Table 1. Demographic Information	N= 293 No Readmit	N= 64 Readmit
Age (years), mean ± SD	66 ± 11.6	66 ± 12.9
Gender:		
Male	217 (74%)	39 (61%)
Female	76 (26%)	25 (39%)
Ethnicity:		
Caucasian	281 (96%)	59 (92%)
African American	6 (2%)	2 (3%)
Other	6 (2%)	3 (5%)
Weight (kg), mean ± SD	90 ± 19.8	88 ± 22.5
Height (inches), mean ± SD	68 ± 4.0*	67 ± 4.2*
Body mass index (kg/m²), mean ± SD	30 ± 5.8	30 ± 6.7
Hospital length of stay (LOS) (days), mean ± SD	7.3 ± 4.5	7.6 ± 3.7
Preoperative LOS, mean ± SD	1.3 ± 2.1	1.3 ± 2
Postoperative LOS, mean ± SD	5.8 ± 15	6.7 ± 12.4
Preoperative disease states:		
Hypertension	212 (72%)	51 (80%)
Diabetes	91 (31%)	20 (31%)
Peripheral vascular disease (PVD)	40 (14%)*	19 (30%)*
Renal failure	23 (8%)	7 (11%)
Chronic lung disease	117 (40%)	29 (45%)
Heart failure	71 (24%)	22 (34%)
Ejection fraction (%), mean ± SD	52.2 ± 12	50.3 ± 13.3
Previous CABG	10 (3%)*	6 (9%)*
Previous valve	7 (2%)	1 (2%)
Previous carotid surgery	10 (3%)*	7 (11%)*
STS risk algorithm score	0.026 ± 0.042*	0.045 ± 0.056*
Postoperative infection	3 (1%)*	3 (5%)*
Last hematocrit (%), mean ± SD	40 ± 5.4*	38 ± 4.6*
Last creatinine level (mg/dL), mean ± SD	1.7 ± 1.1	1.9 ± 1.1
Preoperative medications:		
Beta-blocker	211 (72%)*	49 (77%)*
ACE-I/ ARB	124 (42%)	25 (39%)
Aspirin	232 (79%)	56 (88%)
Lipid lowering agent	228 (78%)	49 (77%)
ADP Inhibitor or Thienopyridine	55 (19%)	16 (25%)

*p<0.05

RESULTS

Table 2. Operative and Postoperative Information	N= 293 No Readmit	N= 64 Readmit
Procedure:		
CABG only	40 (63%)	192 (66%)
CABG plus valve (aortic ± mitral)	5 (8%)	35 (12%)
Valve (aortic ± mitral) only	18 (28%)	66 (22%)
Concomitant surgical correction of AF	25 (9%)†	1 (2%)†
On-pump CTS procedure	211 (72%)	41 (64%)
Cross clamp time (min), mean ± SD	87.7 ± 29.8	94.5 ± 36.3
Perfusion time (min), mean ± SD	117.2 ± 39.8	124.3 ± 40.9
Postoperative ventilator time (hr), mean ± SD	5.8 ± 15	6.7 ± 12.4
Postoperative atrial fibrillation	68 (23%)	19 (30%)
Postoperative renal failure	19 (6%)	7 (11%)
Number of home meds, mean ± SD	8.1 ± 5.2	9.5 ± 26.3
Number of discharge meds, mean ± SD	10.6 ± 4.9*	12.1 ± 5.3*
Discharged to home	229 (88%)*	43 (67%)*
Time between discharge and 1st cardiac rehabilitation visit (days), mean ± SD	18 ± 22.8	25 ± 26.3

*p < 0.05, †p=0.05

- The number of discharge medications, STS risk score, peripheral vascular disease, prior CABG or carotid surgery were significantly correlated with readmission (p<0.05).

CONCLUSIONS

- Patients in the Readmit group had significantly more discharge medications and postoperative infections, higher STS risk score, a history of PVD or prior CABG or carotid surgery, preoperative use of a beta-blocker, lower hematocrit levels, and less concomitant surgery for correction of AF compared to the No Readmit group.
- Factors significantly correlated with early readmission included the number of discharge medications, STS risk score, PVD, prior CABG or carotid surgery.
- Further research is necessary to understand if additional patient education targeting these populations can prevent early hospital readmission after cardiothoracic surgery.

[1] Stewart RD, et al. Predictors of 30-day hospital readmission after coronary artery bypass. Ann Thorac Surg, 2000;70:169-7